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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,221	04/02/2004	Takayuki Nakamoto	43888-310	7325
7590 12/02/2008 MCDERMOTT, WILL & EMERY 600 13th Street, N.W. WASHINGTON, DC 20005-3096				
EXAMINER CHUO, TONY SHENG HSIANG				
ART UNIT		PAPER NUMBER		
1795				
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12/02/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/816,221

**Applicant(s)**

NAKAMOTO ET AL.

**Examiner**

Tony Chuo

**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 November 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4 and 6-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)  
Paper No(s)/Mail Date \_\_\_\_\_

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/6/08 has been entered.

### ***Response to Amendment***

2. Claims 1-4 and 6-9 are currently pending. Claims 5 and 10-12 are cancelled. The amendment does overcome the previously stated 103 rejection of claim 6. However, the amendment does not overcome the previously stated 103 rejection of claims 1-4 and 7-9. Therefore, upon further consideration, claim 1-4 and 6-9 are rejected under the following new and previously stated 103 rejections.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-4 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tarui et al (JP 2003/077529) in view of Yamamoto et al (US 2003/0054249).

The Tarui reference discloses a lithium secondary battery using a negative electrode active material capable of absorbing/desorbing lithium comprising silicon or an alloy mainly containing silicon and an element selected from the group consisting of Ti, V, Mn, Fe, Co, Zr, Mo, and W, wherein the negative electrode active material is in the form of a thin film (See Abstract and paragraph [0018]). It also discloses using an amorphous Si phase (See paragraph [0013]).

However, Tarui et al does not expressly teach a surface layer comprising silicon oxide of 0.2 to 1,000 nm in average thickness formed on the inner layer, wherein the average thickness of the surface layer is 1 to 100 nm, wherein the average thickness of the surface layer is 1 to 10 nm, and wherein the surface layer has a thickness in the range of  $\pm 50\%$  of the average thickness. The Yamamoto reference discloses a silicon oxide film "5b" that is formed on an anode layer "3b", wherein the silicon oxide film has a thickness of 1.6 nm (See paragraph [0100],[0101], [0105]). Examiner's note: it is inherent that the silicon oxide film formed by vapor deposition would have a thickness in the range of  $\pm 50\%$  of the average thickness since it is well known in the art that the vapor deposition process forms a very uniform layer (See paragraph [0101]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Tarui battery to include a surface layer comprising silicon oxide formed on the inner layer, wherein the surface layer has a thickness of 1.6 nm, and wherein the surface layer has a thickness in the range of  $\pm$

50% of the average thickness in order to reduce an anode potential during discharging that results in an increase in a battery operating voltage and to reduce the hydrofluoric acid level in the electrolyte which decreases the resistance within the battery by preventing positive ions in the cathode from eluting or LiF from forming on the anode surface excessively (See paragraphs [0093],[0100],[0111]).

5. Claims 1-4, 6, 7, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukui et al (2004/0062991) in view of Yamamoto et al (US 2003/0054249).

The Fukui reference discloses a lithium secondary battery using a negative electrode active material capable of absorbing/desorbing lithium comprising silicon or an alloy containing silicon and magnesium, wherein the negative electrode active material is in the form of a thin film (See paragraph [0034],[0036],[0037] and Figure 1). It also discloses a silicon alloy that is prepared by liquid quenching and gas atomizing (See paragraph [0034]). Examiner's note: Regarding claim 6, it is contended by the examiner that Fukui teaches a process of forming the silicon alloy that is similar to the process described on page 23 of the specification of the present invention. Specifically, the process of melting the particles and then cooling the mixture in Ar atmosphere by atomization is similar to the Fukui process of liquid quenching and gas atomizing. Therefore, it is inherent that the Fukui negative electrode active material contains a Si phase and an alloy phase containing Si and an element because both silicon alloys were made by a similar process.

However, Fukui et al does not expressly teach a surface layer comprising silicon oxide of 0.2 to 1,000 nm in average thickness formed on the inner layer, wherein the average thickness of the surface layer is 1 to 100 nm, wherein the average thickness of the surface layer is 1 to 10 nm, and wherein the surface layer has a thickness in the range of  $\pm 50\%$  of the average thickness. The Yamamoto reference discloses a silicon oxide film "5b" that is formed on an anode layer "3b", wherein the silicon oxide film has a thickness of 1.6 nm (See paragraph [0100],[0101], [0105]). Examiner's note: it is inherent that the silicon oxide film formed by vapor deposition would have a thickness in the range of  $\pm 50\%$  of the average thickness since it is well known in the art that the vapor deposition process forms a very uniform layer (See paragraph [0101]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Fukui battery to include a surface layer comprising silicon oxide formed on the inner layer, wherein the surface layer has a thickness of 1.6 nm, and wherein the surface layer has a thickness in the range of  $\pm 50\%$  of the average thickness in order to reduce an anode potential during discharging that results in an increase in a battery operating voltage and to reduce the hydrofluoric acid level in the electrolyte which decreases the resistance within the battery by preventing positive ions in the cathode from eluting or LiF from forming on the anode surface excessively (See paragraphs [0093],[0100],[0111]).

6. Claims 1-4 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohshita et al (2004/0023111) in view of Yamamoto et al (US 2003/0054249).

The Ohshita reference discloses a lithium secondary battery using a negative electrode active material capable of absorbing/desorbing lithium comprising an alloy of Si and Co, with amorphous silicon as a main component (See paragraph [0060],[0061],[0063]).

However, Ohshita et al does not expressly teach a surface layer comprising silicon oxide of 0.2 to 1,000 nm in average thickness formed on the inner layer, wherein the average thickness of the surface layer is 1 to 100 nm, wherein the average thickness of the surface layer is 1 to 10 nm, and wherein the surface layer has a thickness in the range of  $\pm 50\%$  of the average thickness. The Yamamoto reference discloses a silicon oxide film "5b" that is formed on an anode layer "3b", wherein the silicon oxide film has a thickness of 1.6 nm (See paragraph [0100],[0101], [0105]). Examiner's note: it is inherent that the silicon oxide film formed by vapor deposition would have a thickness in the range of  $\pm 50\%$  of the average thickness since it is well known in the art that the vapor deposition process forms a very uniform layer (See paragraph [0101]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Ohshita battery to include a surface layer comprising silicon oxide formed on the inner layer, wherein the surface layer has a thickness of 1.6 nm, and wherein the surface layer has a thickness in the range of  $\pm 50\%$  of the average thickness in order to reduce an anode potential during discharging that results in an increase in a battery operating voltage and to reduce the hydrofluoric acid level in the electrolyte which decreases the resistance within the battery by

preventing positive ions in the cathode from eluting or LiF from forming on the anode surface excessively (See paragraphs [0093],[0100],[0111]).

### ***Response to Arguments***

7. Applicant's arguments filed 11/6/08 have been fully considered but they are not persuasive.

The applicant argues that the active material of Tarui et al comprises a Si material layer and a first mixture layer formed on the surface of the Si material layer. Therefore, if the oxide layer of Yamamoto et al. is provided on the surface of the active material layer of Tarui et al. (the first mixture layer), the effect achieved by the first mixture layer will be lost. Thus, there would be no motivation to provide the oxide layer of Yamamoto et al. on the surface of the active material of Tarui et al. because doing so would result in eliminating the beneficial effects achieved by Tarui et al. If a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.

Firstly, this argument appears to a statement of the applicant's opinion and not based on any factual evidence. Secondly, there is no evidence to show that the oxide layer of Yamamoto on the surface of the active material of Tarui would result in eliminating the beneficial effects achieved by Tarui et al. Thirdly, since the first mixture layer also contains the same material as the active material layer, the improvement of the Yamamoto oxide layer would also be expected.



***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571)272-0717. The examiner can normally be reached on M-F, 9:00AM to 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC

/Jonathan Crepeau/  
Primary Examiner, Art Unit 1795